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Investigation of the relationship between functional tests and Low Back Pain Functional Scale in patients with chronic low back pain

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ABSTRACT

Aims: The aim of this study is to investigate the relationship between functional scales used to determine the functional level in patients with chronic low back pain and functional tests.

Methods: The study included 39 patients with chronic low back pain. We used the Low Back Pain Functional Scale (LBPFS) as a scale to determine the functional status of patients and the 5-repetition sit-to-stand test (5-RSTST) and timed up and go test (TUGT) as functional tests. Pearson correlation test was used for data analysis.

Results: There was a moderate negative correlation between the total score of LBPFS and 5-RSTST (r: -0.427, $p<0.007$), and a weak negative correlation between LBPFS and TUGT (r: -0.246, $p<0.05$).

Conclusion: LBPFS, which is used to determine the functional level in patients with chronic low back pain, has a moderate negative relationship with 5-RSTST and a weak negative relationship with TUGT. This result shows that LBPFS is insufficient to fully determine the function in patients with chronic low back pain and does not address all the parameters necessary to determine the function. The parts of the structure of LBPFS that are insufficient to determine the function can be reviewed to ensure that it determines the function more consistently. In this way, it is possible to determine the functional level more objectively with only one scale in patients with chronic low back pain who cannot perform functional tests or do not need to perform them.

Keywords: Chronic low back pain, Function Scale, Functional Test

INTRODUCTION

While low back pain is a major disability-causing problem in the world, it is known as the most common cause of absenteeism and the health problem that creates the greatest burden on health systems. Epidemiological studies have shown that 50-80% of people have experienced low back pain at some time in their lives.[1,2]

According to the World Health Organization (WHO), while back pain affected 600 million people in 2020, it is predicted that this number will exceed 800 million in 2050 due to the aging population, and the prevalence of back pain-causing disability is 7.2% worldwide.[3] One of the reasons why back pain reduces the quality of life of patients and causes disability is that it causes functional losses in patients.[4] Survey methods are frequently preferred to evaluate the functional losses commonly seen in patients with back pain, to determine their health status, and to evaluate the results of treatment.[5] However, the patients' pain, their attitudes towards re-injury, and their psychological state can influence these survey methods. Another method of determining functional losses or functional level in patients with back pain is physical performance tests. These tests generally include measurements aimed at completing a task. The patient's psychological state and attitude also influence physical performance tests, but research indicates that this effect is not as significant as the survey method.[6]

There are many scales in the literature used for the purpose of evaluating patients with low back pain, such as the Numerical Rating Scale, Pain Self-efficacy Questionnaire, Patient-Specific Functional Scale, Oswestry Disability Index, and Roland-Morris Disability Questionnaire.[7] Most scale validity and reliability studies were done in Turkish. The Low Back Pain Functional Scale (LBPFS) is the scale that specifically

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targets function as well.[7,8] While the RMDQ and the ODI are wide used, valid, and reliable scales for assesing low back pain, they have certain limitations. The LBPFS demostrates superior internal consistency, test-retest reliability, and sensitivity to change compared to the RMDQ, highlighting its advantages over the latter. Moreover, although the RMDQ and ODI are the most frequently utilized scales in research, they are insufficient in accurately reflecting the level of disability. Previous studies indicate that bhe LBPFS is more effective than RMDQ in detecting clinical changes in patients experiencing back pain for less than two weeks.[7] The previous studies indicate that LBPFS has some superiorties to apply in this study.[8] There are physical performance tests used to evaluate the functional level in patients with low back pain. The timed up and go test (TUGT) and the 5 repetition sit and stand test (5-RSTST) are easy to apply, valid, and reliable methods in terms of evaluating the functional status in patients with low back pain and providing objective information about the patient's functional level.[9] Although scales are widely used in evaluating the functional level in patients with low back pain, these scales are subjective assessments based on the personal statements of the patients. We believe that measuring the functional level with functional tests would be more objective. The use of functional questionnaires instead of physical performance tests may be more practical by saving time and equipment. Additionally, functional quastionnaires may be more reliable for determining functional levels in patients who have problems with balance. However, it has been observed that there is no study has been found examining the relationship between functional questionnaires and functional tests in chronic low back patients. Therefore, this study examines the relationship between LBPFS, which is used to determine the functional level in patients with chronic low back pain, and TUGT and 5-RSTST, which have proven validity and reliability

METHODS

Ethics

For this study, permission was obtained from the Gazi Yaşargil Training and Research Hospital Clinical Researches Ethics Committee (Date: 10.11.2024, Decision No: 238). Specialist physicians diagnosed patients with chronic back pain through clinical and MRI examinations, and provided them with detailed information about the study during interviews. All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

Study Design

The required sample size was calculated using the G*Power 3.1 programme based on an effect size of 0,5, an error probability of 0.05 and statistical power of 0.95. Effect size was determined based upon a medium effect of 0.5 which is calculated with the same programme.[10] The sample should have been composed at least 42 patients. However; during the 5-RSTST performing three of them did not want to finish the test because of increasing their pain. Therefore, we finished the study with 39 patients.

Patients included in the study were between the ages of 18-65 who with low back pain for the last three months. The study excluded patients who had surgery and physiotherapy in the last 6 months, back surgery, rheumatological diseases, cancer patients, pregnant women, those who had physiotherapy in the last 6 months, patients with acute radiculopathy, movement disorders, and hemiplegic patients.

Evaluations

Low Back Pain Functional Scale: Developed by Stratford and colleagues, it is a scale used to determine the functional level in patients with low back pain, and its validity and reliability have been proven. The validity and reliability of the Turkish version of the scale have been proven by Maraş et al.[8] The scale rates the patient's ability to perform daily housework, bend and squat, lift boxes from the floor, stand, and walk, with 12 items ranging from unable to perform to not difficult. The total score is evaluated between 0 and 60 points, and a higher score indicates that the patient's condition is better.[8]

Timed up and go test: This test was developed to demonstrate the functional status quickly and practically, and its reliability has been proven in patients with low back pain. The patient stands up from a sitting position on a backless chair and walks quickly to a marked location 3 meters away, then returns and sits back on the chair. The stopwatch is started when the test begins. The time from the beginning of the test to the time the patient places his/her hips on the chair is measured and recorded in seconds.[9]

Five Repetitive Sit-to-Stand Test: This test is a performance test, and its reliability has been proven in patients with chronic low back pain. The person is asked to sit in a standard chair with their arms crossed on their chest and is asked to sit down and stand up from the chair five times without changing their arm position. The performance time is measured with a stopwatch and recorded in seconds.[9]

These tests are easy to apply and not required many equipments and time to apply. These are the superiorities of this tests that we decided to use instead of the other functional test such as 6 minute walk test or 50 metre walking test. And also valid, and reliable methods in terms of evaluating the functional status in patients with low back pain and providing objective information about the patient's functional level.

Visual Analogue Scale (VAS): On a 10 cm horizontal line, the left starting point means no pain and the right end point means unbearable pain. The patient is asked to determine the intensity of pain. It is a measurement method with high reliability and validity in pain assessment.[11]

Statistical Analysis

The data of this study was made with the IBM® SPSS Version 21 program. In order to determine whether the data was normally distributed, normality analysis was performed. Since the values of skewness (0.506) and kurtosis (-0.552) were between +1.5 and -1.5, it was determined that the data was normally distributed.[12] Depending on this result, the Pearson test of the correlation test was selected. The coefficients' of Pearson test ranges from +1 (perfect positive corelation) to -1 (perfect negative corelation) with 0 indicate no corelation. Value of r means between .00-.19 very weak, .20-.39 weak, .40-.59 moderate, .60-.70 strong and .80-1.0 very strong.[13] As the second stage, the correlation analysis between LBPFS and TUGT and 5-RSTST was performed. The significant value was accepted as $p<0.05$.

RESULTS

Of the patients participating in the study, 30 were female (76.9%) and 9 were male (23.1%). The mean age of female patients was 38.5±7.5 years, the mean age of male patients was 40±6.3 years, and the mean age of all patients was 38.71±7.2 years (Table 1). In addition, 4 patients were single (10.25%) and 35 patients were married (89.75%). The mean of VAS was 5.589±2.17 and pain duration was 6.121±5.26 years.

Table 1. Demographic information of the patients included in the study

Gender	Age, mean±SD	n	%
Female	38.5±7.5	30	76.9
Male	40±6.3	9	23.1
Total	38.71±7.28	39	100

SD: Standard deviation

The correlation of between the patients' LBPFS total score and the TUG test was found (p>0.05 (r: -0.246) which was a weak negative correlation. It means LBPFS and TUG test result cannot give us similar results to assest of functional level of patient with low back pain. Therefore, LBPFS should not be preferenced to use instead of TUG test. The correlation of between the patient's LBPFS total score and 5-RSTS test was found (p<0.007 (r: -0.427) which was a moderate score. It means there is no strong relation between 5-RSTS test and LBPFS. However; LBPFS can be choosen instead of 5-RSTS test in some cases like patient can not achieve the physical performance tests (Table 2).

Table 2. Correlation between LBPFS and TUGT, 5-RSTST (new)

		LBPFS	
	Mean±SD	r	p
TUGT	9.36±1.85	-0.246	0.131
5-RSTST	16.64±4.107	-0.427	0,007
LBPFS	36.41±10.47		

LBPFS: Low Back Pain Functional Scale, TUGT: Timed Up and Go Test Pearson Correlation Test (r: +1 to -1) (p<0.05), 5-RSTST: 5-Repetition Sit-to-Stand Test, SD: Standard deviation

DISCUSSION

This study aimed to examine the relationship between LBPFS, a questionnaire assessment applied to patients with chronic low back pain, and TUGT and 5-RSTSTs, which are performance tests. According to the results we found, a moderate negative relationship was found between LBPFS and 5-RSTST, and a very weak negative relationship was found between TUGT.

Although the age range in our study was determined as 18-65, the age group was concentrated between 30-45. In order to adapt the study to the general, a more general comment can be made with a study in which equal patients from all age decades participated. One study that looked at the connection between different patient groups and functional tests was by Başar et al.[14] They looked at the connection between the Western Ontario Rotator Cuff Index and the 9 hole peg test to see how well patients with torn rotator cuffs could use their shoulders. They found that there wasn't a strong link between the scales and the tests. As a result of their study, they stated that scales and performance tests cannot be used interchangeably. Wijlhuizen et al.[15] examined the relationship between the scale used to measure disability and observation-based physical performance tests. As a result of the study, they stated that there was a weak-moderate relationship between the scale used to measure disability and observation-based physical performance tests.

Latham et al.[16] examined which of the self-report scales and physical performance tests would be more effective in determining physical function in patients with hip fractures. In the study, they used the Physical Mobility and Personal Care Scale, the 36-item short form Health Survey Physical Function Scale (SF-36 PF), and the physical functional performance test (PFP-10) as Self-Report Scales, as well as the short physical performance battery, 4-meter walking speed, and 6-minute walking test assessments for physical performance tests. As a result of the study, they stated that the sensitivity, validity, and responsiveness of self-report scales and physical performance tests gave similar results in patients followed up after hip fractures and that both could be used in clinical studies. They commented that picking the most appropriate functional measurement type for a clinical study would depend on the applicability of the measurement and the strength of the relationship between the study intervention method and a functional outcome measurement.

Lee et al.[6] They examined whether there is a relationship between self-reported activity limitations (e.g., walking, bending, getting up from a chair, putting on socks, and doing heavy work) and a functional performance battery consisting of six tests measured by the clinician in patients with low back pain. The Roland-Morris Disability Questionnaire was used to find out what activities people could not do and their lumbar flexion range of motion. The functional performance battery included a 15-meter walk at top speed, a 5-minute walk, 5 sit-to-stand repetitions, 10 trunk flexions, and a loaded reach task where patients reached forward while holding a weight equal to 5% of their body weight. They found a moderate relationship between the scale they used in the study and physical performance tests in patients with low back pain. The study results showed that measuring physical function solely through questionnaires or function tests based on physical performance would not be sufficient[5]. In this study, the LBPFS, which questions self-reports, and the TUGT and 5-RSTSTs based on physical performance were used to determine the functional levels of patients with chronic low back pain. Of these tests, TUGT was found to be very weakly correlated with LBPFS. TUG test inclued standing-up, walking, turning back and sitting down so it is a dynamic function. Patients must also maintain their balance while the TUG test is being performed. For this reason, correlation between LBPFS and TUG test can be weak correlatin. And also 5-RSTST was found to be moderate correlated with LBPFS. One of the reasons of this can be patient's physicology or level of understanding of reading as the LBPFS is a self-report scale. The other reason can be that 5-RSTS test can also be affacted by individual conditions such as pain.

Based on this result, we can say that using the 5-RSTST test or one of the TUGT instead of a subjective assessment method that questions the patient's self-reporting, such as LBPFS, in patients with chronic low back pain can provide more objective information about the functional level of the patients. Both of the tests used in the study are easy to perform, pose no risk to the patients, do not require a special environment, and can be completed in a short time.

Either 5-RSTST or TUGT can be selected to determine the functional level in patients with chronic low back pain. The results of Basar et al.,[14] Wijlhuizen et al.,[15] and Lee et al.[6] from the studies in the literature are consistent with the results of this study. These studies all agree that the relationship is either low, weak, or moderate. This weak-moderate relationship means that scales based on patient self-reporting are not capable of fully determining the functional level in chronic low back patients. We believe that it would be beneficial to improve the scales that measure the functional levels of chronic low back patients based on self-reporting in the future to provide results close to physical performance tests. The results of our study did not match those of the study conducted by Latham et al.[16] The difference between the study results may be due to the fact that the two studies were conducted on different patient groups. The scales used in the evaluation of hip fracture patients may have been prepared with a higher quality in determining physical performance.

Although the age range in our study was determined as 18-65, the age group was concentrated between 30-45. In order to adapt the study to the general, a more general comment can be made with a study in which equal patients from all age decades participated.

Limitations
Lack of diverse functional tests, concentration of the age range between 30-45, sample size not reaching sufficient number.

CONCLUSION
Instead of a subjective assessment method such as LBPFS, which questions the patient's self-report in patients with chronic low back pain, 5-RSTST or one of the TUGT can be used. The moderate correlation between LBPFS and 5-RSTST indicates that there are factors other than those questioned by LBPFS in determining the functional level in patients with chronic low back pain. This suggests that LBPFS is not fully sufficient to determine the functional level in patients with chronic low back pain. Expanding the LBPFS questioning framework and revising the existing questions may enable the scale to yield more objective results.

ETHICAL DECLARATIONS
Ethics Committee Approval
The study was carried out with the permission of Gazi Yaşargil Training and Research Hospital Clinical Researches Ethics Committee (Date: 10.11.2024, Decision No: 238).

Informed Consent
All patients signed and free and informed consent form.

Referee Evaluation Process
Externally peer-reviewed.

Conflict of Interest Statement
The authors have no conflicts of interest to declare.

Financial Disclosure
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Author Contributions
All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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